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INHERITANCE OF BELTING SPOTTING IN CATTLE AND SWINE

IT has long been noted that when two belted individuals are bred together only part of their offspring show true belts.

Taking the Dutch Belted breed in cattle, although the new belted Galloway (Ashton) may later serve just as well, we find that in practically all pure-bred herds there appear individuals with imperfect belts and more often those that are pure black.

Kuiper has furnished us with the most promising results so far. He shows that the characteristic markings of the Lakenvelder or Dutch Belted breed may be obtained by crossing within the breed or by crossing with spotted cattle. In his experiments a belted bull was bred to 55 Holstein-Friesian cows and produced as offspring 27 belts, 24–25 self-black, and 3–4 spotted. The identity of one calf was doubtful.

To explain these results he takes two pairs of allelomorphic factors L-l for belt, epistatic over E-e for self, and a repulsion between L and E in the reduplication series 1–7–7–1. A fairly high correlation exists between white feet and wide belts. This correlation agrees closely with Walther's work on horses.

Kuiper's work may be criticized on the fact that he has no definite grounds for assuming the presence of allelomorphic factor pairs. He does not assume a factor for white spotting that will take in all parts of the animal.

In crosses between the single colored reddish-brown Netherland cattle (Richardson) a very few self-color individuals were produced. Crosses between the reddish-brown Netherland cattle (Kiesel) and Holstein-Friesians produced in the F_1, 90 well spotted, 84 medium spotted, and 6 self-colored individuals, showing that the dominance of either character was not complete. Crossing the F_1 individuals together gave 22 self-colored and 29 spotted. These results show that the Holstein-Friesian markings are of a heterozygous type and Holstein-Friesians when bred to Dutch Belted gave practically a 1–1 ratio. Assuming that all possible factor combinations were made this would easily prove that the belting in the Dutch Belted breed is a simple heterozygous condition and explains the appearance of offspring other than belts when belts are bred together.

In Hampshire swine there seems to have been considerable selection within the breed. Originally they were white or black and white (Youatt). Later, selection brought them to their present color either black or black with a white belt (Day). White spotting other than belts appear, also an excessive white belting condition covers all but the extremities of the ears and the tail. Spillman states that ten per cent. of the progeny of registered individuals are without belted areas. He supposes two types of belting (*a*) homozygous, occurring very rarely, and (*b*) heterozygous, occurring as the common type. In crosses of other breeds on Hampshires (Simpson) (Severson) the spotting condition proved to be heterozygous, for when bred to recessive colored breeds the ratio of belts to non-belts was 11–10 (expected ratio 10.5–10.5).

Summing up all evidence so far on the inheritance of belting spotting one would be safe in saying that this character is due to a single heterozygous factor pair Ss for white spotting.

G. B. Durham

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Third Contribution: The Exposure Factor

The great convenience to be derived from the use of only two tables of factors is so apparent that anybody who is at all familiar with microphotographic work should not for a moment